

Sheet 4

immediate

15

ADD # Num, R_i

① Suppose your instruction is two word so your operand in 2nd word

1 - P_{Cout} , MAR_{in} , Read, Select u, add Z_{in}

2 - Z_{out} , P_{Cin} , Y_{in} , WMFC

3 - MDR_{out} , IR_{in}

4 - P_{Cout} , MAR_{in} , Read, Select u, Add, Z_{in}

5 - Z_{out} , P_{Cin} , Y_{in}

6 - R_{out} , Y_{in} , WMFC

7 - MDR_{out} , Select u, Add, Z_{in}

8 - Z_{out} , R_{in} , End.

1

Sec 9

③ ADD $\stackrel{\text{Absolute}}{\text{num}}, R_i$

④

⑤ $Z_{out}, R_{in}, Y_{in}, WMFC$

⑥ $MDR_{out}, MAR_{in}, \text{Read}$

⑦ $R_{out}, Y_m, WMFC$

⑧ $MDR_{out}, \text{select } y, \text{Add}, Z_{in}$

⑨ $Z_{out}, R_{in}, \text{End.}$
ADD $\stackrel{\text{indirect}}{(num)}, R_i$

④

①

⑥ $MDR_{out}, MAR_{in}, \text{Read}, WMFC$

⑦ $MDR_{out}, MAR_{in}, \text{Read}$

8, 9, 10 \rightarrow 7, 8, 9

② sec 9

a Program for A, B, C

1 \rightarrow u

5 - Z_{out} , P_{Cin} , y_{in} if Imm branch to 1.

6 - WMFC

7 - MDR_{out} , MAR_{in} , Read, if Abs branch

8 - WMFC

9 - MDR_{out} , MAR_{in} , Read

10 - 7 \rightarrow 9

3

Sec 9

$$\boxed{7} \quad \frac{28}{42} = 67\%$$

2ns

1 -	---	memory	16ns
2 -	---	WMFC	CPU \leftarrow 2ns
3 -	---		2ns
4 -	---	WMFC	16ns
5 -	---		2ns
6 -	---		2ns
7 -	---		2ns

How long does memory take as a percent
of overall time of CPU instruction exec.

4 sec

sheet 5

- Single bus CPU

1- PC_{out} , MAR_{in} , Read, Select 4, Add, Z

2- Z_{out} , PC_{in} , Y_{in} , write

3- MDR_{out} , IR_{in}

Branch \leftarrow

4- (offset field of IR) out , Add, if $N=1$
then PC_{in} , End

- multi bus CPU \leftarrow new sign

1- PC_{out} , $R=B$, MAR_{in} , Read, Inc PC

2- $WNPc$

3- MDR_{out} , $R=B$, IR_{in}

4- PC_{out} , (offset field of IR) out

* Add, if $N=1$, then PC_{in} , End.

5

Sec 9